

**FLOOD INSURANCE STUDY  
LANCASTER COUNTY, NEBRASKA AND INCORPORATED AREAS**

**1.0 INTRODUCTION**

**1.1 Purpose of Study**

This Flood Insurance Study revises and updates information on the existence and severity of flood hazards in the geographic area of Lancaster County, including the Cities of Hickman, Lincoln, and Waverly; the Villages of Bennet, Davey, Denton, Firth, Hallam, Malcolm, Panama, Raymond, Roca, and Sprague; and the unincorporated areas of Lancaster County (referred to collectively herein as Lancaster County), and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood-risk data for various areas of the community that will be used to establish actuarial flood insurance rates and to assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

Please note that the Villages of Firth and Hallam are geographically located in Lancaster and Gage Counties. The Villages of Firth and Hallam are included in their entirety in this Flood Insurance Study report.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the State (or other jurisdictional agency) will be able to explain them.

**1.2 Authority and Acknowledgments**

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for the original study for the City of Lincoln were performed by the U.S. Army Corps of Engineers (USACE), Omaha District (the study contractor), for the Federal Emergency Management Agency (FEMA), under Interagency Agreement No. IAA-H-18-78, Project Order No. 12. The flood elevations, flood boundaries, and floodway data for Stevens Creek were provided by the Natural Resources Conservation Service (NRCS) (formerly the Soil Conservation Service).

The hydrologic and hydraulic analyses for the original studies for the Cities of Hickman and Waverly; the Villages of Bennet, Firth, and Raymond; and the unincorporated areas of Lancaster County were performed by Henningson, Durham and Richardson (HDR), for FEMA, under Contract No. H-4773. The studies for the City of Hickman and Villages of Bennet and Firth were completed in November 1979, for the Village of Raymond in February 1980, and for the City of Waverly and the unincorporated areas of Lancaster County in March 1980.

### 1.3 Coordination

The time and cost meeting for the City of Lincoln was held on December 15, 1977, in the Lincoln-Lancaster City-County Building. This meeting also met the requirements of an initial Consultation Coordination Officer (CCO) meeting. It outlined the forthcoming study to local officials and provided the USACE with the information necessary to submit a time and cost estimate to perform the study. Representatives of the study contractor, FEMA, the City of Lincoln, the Lower Platte South Natural Resources District (NRD), and the State of Nebraska were in attendance. The identification of streams requiring detailed study and the decision to update the hydrology for those streams were also accomplished at this meeting with agreement by all personnel in attendance. The information necessary for developing a community base map was obtained from the City of Lincoln.

A coordination meeting was held on April 1, 1980, in the Lincoln-Lancaster City-County Building to discuss the inclusion of the Oak Creek channel improvements and other matters related to the study. Representatives of the study contractor, the City of Lincoln, the Lower Platte South NRD, and the State of Nebraska attended.

Meetings were held on September 11 and November 12, 1981, with representatives of the study contractor, the Lower Platte South NRD, the State of Nebraska, the Railroad Transportation Safety District, and the City of Lincoln attending. At the September 11 meeting, the preliminary results of the hydrologic studies were discussed. As a result of that meeting, a hydrologic report explaining study procedures was prepared and distributed to the participants, the NRCS, and the U.S. Geological Survey (USGS). Comments on the report were received and discussed at the November 12 meeting.

Further discussion of preliminary results occurred at an informal meeting with representatives of the study contractor and HDR, which acted as a consultant to the Lower Platte South NRD. On May 13, 1982, a meeting was held in Washington, D.C., and attended by representatives from the USACE, Omaha District; the USACE Office of the Chief of Engineers; and U.S. Congressman Douglas Bereuter's office.

On July 27, 1982, a meeting was held with representatives of the USACE, FEMA (Washington, D.C., and Region VII offices), the City of Lincoln, the Lower Platte South NRD, and Congressman Bereuter's office. The meeting was requested by the FEMA Central Office in Washington, D.C. The following day, a field trip to the City of Lincoln was conducted.

The intermediate CCO meeting was held on June 2, 1983. Preliminary results of the original Flood Insurance Study for the City of Lincoln were discussed. Representatives of the USACE, FEMA, the NRCS, the State of Nebraska, the Lower Platte South NRD, the City of Lincoln, Senator Edward Zorinsky's office, and Congressman Bereuter's office were in attendance.

The results of the original study for the City of Lincoln were reviewed at the final CCO meeting held on May 10, 1984, and attended by representatives of the study contractor, FEMA, and the City of Lincoln. All problems raised at that meeting were addressed in that study.

Community base map selection and the identification of streams requiring detailed study were done at the initial CCO meetings for the original studies for the City of Hickman and the Village of Raymond held on March 13, 1978, and for the City of Waverly, the Villages of Bennet and Firth, and the unincorporated areas of Lancaster County held on March 14, 1978. Representatives of each respective community, FEMA, and HDR, were present at each of the meetings.

Hydrologic analyses and flood profiles were coordinated with the USACE for the following streams: Salt Creek, Stevens Creek, Oak Creek, North Oak Creek, Middle Creek, and Haines Branch. Hydrologic analyses and flood profiles were coordinated with the NRCS for the following streams: Little Nemaha River, Unnamed Tributary to Little Nemaha River, and Middle Branch Big Nemaha River. Hydrologic analyses and flood profiles for Ash Hollow Ditch were coordinated with the firm of Hoskins, Western and Sonderegger and the City of Waverly.

During the course of the work, flood elevations, flood boundaries, and floodway delineations were reviewed with community officials along with one or more of the following: the Flood Plain Management Branch of the USACE, Omaha District; the NRCS, Water Resources Division; and the Lower Platte South NRD.

The results of the studies discussed above were reviewed at the final CCO meetings attended by representatives of HDR, FEMA, the Nebraska Natural Resources Commission (NNRC), and each community. All problems raised by the communities were addressed at each meeting. The dates for the final CCO meetings are as follows:

Village of Firth	April 17, 1980
Village of Bennet	April 21, 1980
Village of Raymond	August 11, 1980
City of Hickman	February 24, 1981
Lancaster County	February 24, 1981
City of Waverly	April 6, 1981

## **2.0    AREA STUDIED**

### **2.1    Scope of Study**

This Flood Insurance Study covers the geographic area of Lancaster County, Nebraska, including the incorporated communities listed in Section 1.1.

The areas studied by detailed methods were selected with priority given to all known flood hazards and areas of projected development or proposed construction through March 1988.

The flooding sources studied by detailed methods are listed below:

- Antelope Creek, from the mouth to approximately 1.4 miles upstream of Pioneers Boulevard
- Ash Hollow Ditch, from its mouth at Salt Creek to just downstream of Interstate Highway 80
- Beal Slough, from the mouth to just upstream of South 70th Street

- Middle Branch Big Nemaha River, from the southern County boundary to 1,700 feet upstream of the confluence with Kraatz Creek
- Cardwell Branch, from the mouth to approximately 3,700 feet upstream of Southwest 27th Street
- Deadman's Run, from the confluence with Salt Creek upstream to A Street
- Elk Creek, from the mouth to approximately 0.85 mile upstream of U.S. Highway 34
- Haines Branch, from the mouth to approximately 800 feet upstream of the Burlington Northern Railroad (BNRR), and from the City of Lincoln extraterritorial limits to West Old Cheney Road
- Hickman Branch, from approximately 0.27 mile downstream of State Highway 477 to approximately 0.48 mile upstream of Chestnut Street
- Hickman Branch Tributary, from its confluence with Hickman Branch to approximately 0.17 mile upstream of Seventh Street
- Little Nemaha River, from approximately 4,400 feet downstream of State Route 43 to approximately 3,200 feet upstream of State Route 43
- Unnamed Tributary to Little Nemaha River, from its confluence with the Little Nemaha River to approximately 7,100 feet upstream
- Lynn Creek, from the mouth to approximately 800 feet upstream of Interstate 180
- Middle Creek, from the mouth to approximately 800 feet upstream of Northwest 98th Street
- South Branch Middle Creek, from the mouth at Middle Creek to the County boundary (Southwest 140th Street)
- Oak Creek, from the confluence with Salt Creek to just upstream of U.S. Highway 34 and from approximately 300 feet upstream of West Bluffs Road to State Highway 79
- North Oak Creek, from the confluence upstream to the extraterritorial limit near West Branched Oak Road, and from approximately 2,100 feet downstream of West Agnew Road to approximately 800 feet upstream of Northwest 70th Street
- Salt Creek, from 5,000 feet downstream of North 148th Street to just upstream of U.S. Highway 77, and from approximately 7,750 feet downstream of the City of Lincoln southern extraterritorial limits to Saltillo Road
- Stevens Creek, from the mouth to approximately 8,700 feet upstream of Pine Lake Road
- Stevens Creek Overflow, from the confluence with Salt Creek to the divergence from Stevens Creek
- Stevens Creek Tributary, from the mouth to approximately 1.85 miles upstream of 112th Street

Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon, by FEMA and the communities.

The upper reaches of the following three streams in the City of Lincoln were delineated using approximate methods: Salt Creek, from the extraterritorial limits to 0.5 mile downstream of 98th Street, and from 150 feet upstream of the confluence of Cardwell Branch to the extraterritorial limits; Oak Creek, upstream of U.S. Highway 34; and Haines Branch, upstream of the BNRR. Little Salt Creek, South Branch Antelope Creek, and portions of Deadman's Run were studied entirely by approximate methods. The method of study on each stream was agreed to by FEMA and the City of Lincoln.

The balance of the Little Nemaha River above and below the detailed study to the limits of extraterritorial jurisdiction for the Village of Bennet was studied by approximate methods. The balance of Unnamed Tributary to Little Nemaha River above Bennet Road to the limits of extraterritorial jurisdiction was studied by approximate methods.

The balance of Hickman Branch above and below the detailed study to the limits of extraterritorial jurisdiction for the City of Hickman was studied by approximate methods. The balance of Hickman Branch Tributary above the detailed study to the limits of extraterritorial jurisdiction was studied by approximate methods.

Portions of the Middle Branch Big Nemaha River, Fossbender Creek, Kraatz Creek, and two branches of Kraatz Creek were studied by approximate methods in the Village of Firth.

Oak Creek Tributary was studied by approximate methods from upstream of State Highway 79 to the extraterritorial limits for the Village of Raymond.

In the City of Waverly, Ash Hollow Ditch, upstream from Interstate Highway 80 was studied by approximate methods. Unnamed Tributary Nos. 1 and 2 were studied by approximate methods within the extraterritorial limits for the City of Waverly.

## 2.2 Community Description

Lancaster County is located in east-central Nebraska, bounded on the north by Saunders County; on the east by Cass, Saunders, and Otoe Counties; on the south by Gage County; and on the west by Saline and Seward Counties. The population of Lancaster County, from the 1970 census, was 167,972. The population of the County from the 1990 census was 213,641 (Reference 1). The City of Lincoln, which is the second largest City in Nebraska, occupies nearly 30 square miles and had a 1970 population of 149,518. The City of Lincoln is the County seat and State capital (Reference 2).

The Village of Bennet is located in the east-central part of Lancaster County, approximately 15 miles southeast of Lincoln. The Village is bordered on all sides by unincorporated Lancaster County. The Village lies on the north bank of the Little Nemaha River and Unnamed Tributary to Little Nemaha River. The community is served by State Highway 43 and the BNRR. Other communities in the area are Roca, which is 8 miles west; Panama, which is 5 miles south; Hickman, which is 7 miles southwest; and Firth, which is 11 miles southwest. The Village of Bennet is primarily an agricultural community, with grain elevators being the major industry. Commercial development is likely to continue to occur along the railroad tracks or near the center of town (Garden and Monroe Streets), although no new major development is expected. The population of the Village of Bennet from the 1970 census was 498, and from the 1990 census was 544 (Reference 1).

The Village of Firth is located on the southern boundary of Lancaster County, approximately 17 miles south of Lincoln. The Village lies on the north bank of Middle Branch Big Nemaha River and is surrounded by unincorporated areas of Lancaster County. The community is served by State Highway 341 and the BNRR. Nearby communities include Holland, which is 4 miles north; Panama, which is 7 miles northeast; Hickman, which is 6 miles northwest; and Courtland, which is 6 miles west. The

population of the Village of Firth in 1970 was 328, and from the 1990 census was 471 (Reference 1).

The City of Hickman is located in southeastern Lancaster County, approximately 10 miles south of Lincoln. The City lies on the northeast bank of Hickman Branch, with Hickman Branch Tributary running northeast to southwest through the center of Hickman. The City of Hickman has a 1-mile extraterritorial jurisdiction. The community is served by State Highway 43 and the BNRR. Other communities in the area are Roca, which is 3 miles northwest; Beatrice, which is 24 miles south; Bennet, which is 7 miles northeast; and Firth, which is 6 miles south, while the City of Hickman itself is surrounded by the unincorporated areas of Lancaster County. The population of Hickman from the 1970 census was 415, and from the 1990 census was 1,081 (Reference 1).

The City of Lincoln is located in central Lancaster County. The City is bordered on all sides by the unincorporated areas of Lancaster County, but the extraterritorial limits of the City of Lincoln are contiguous with the extraterritorial limits of the City of Waverly on the north. The 1980 census for Lincoln indicated a population of 171,932 (Reference 3). The population of Lincoln from the 1990 census was 191,972 (Reference 1). Lincoln is served by newspaper, radio, and television facilities, Interstate Highways 80 and 180, U.S. Highways 6, 34, and 77, State Highways 2 and 79, the Union Pacific; Burlington Northern; Missouri Pacific; Chicago, Rock Island and Pacific; and Chicago and North Western Railroads, and the Lincoln Municipal Airport.

The City of Lincoln has an abundance of industrial and commercial activities, including electronics, manufacturing, and a variety of agricultural and transportation-related industries. Recreational facilities such as parks, tennis courts, golf courses, and swimming pools are available. The City is the capital of Nebraska, and as such, it is the location of many State agencies. Educational facilities in Lincoln consist of private, parochial, and public elementary, junior, and senior high schools; one college; and two universities.

The Village of Raymond is located in the northwest quadrant of Lancaster County, approximately 11 miles from downtown Lincoln. The Village is encompassed by unincorporated Lancaster County. It lies on the left bank of North Oak Creek just upstream of the confluence with Oak Creek. Major transportation routes are State Highway 79, running north to south adjacent to the community, and the Union Pacific Railroad. The unincorporated Village of Agnew is located 5 miles upstream, and the City of Lincoln lies 11 miles downstream.

The Village of Raymond is an agricultural community, with a grain elevator and implement dealer being the primary commercial enterprises. The population from the 1970 census was 187, and from the 1990 census was 167 (Reference 1).

The City of Waverly is located approximately 11 miles northeast of the City of Lincoln, on the right bank of Salt Creek, in northwest Lancaster County. It is encompassed by unincorporated Lancaster County. The Village of Greenwood lies approximately 8 stream miles downstream, and the City of Lincoln lies approximately 11 stream miles upstream of the City of Waverly along Salt Creek. Major transportation routes are Interstate Highway 80 running from northeast to southwest, south of the community; U.S. Highway 6; and the BNRR running from northeast to southwest through the community. The primary industries in the City of Waverly are light manufacturing and

agribusiness. The 1970 population was 1,152. The population from the 1990 census was 1,869 (Reference 1).

The following communities had no previous Flood Insurance Study reports; therefore, no information for them was incorporated into this new countywide report except for the population data provided below. All data were acquired from the 1990 census (Reference 1).

<u>Community</u>	<u>1990 Population</u>
Village of Davey	160
Village of Denton	161
Village of Hallam	309
Village of Malcolm	181
Village of Panama	207
Village of Roca	84
Village of Sprague	157

The climate in the study area is subhumid, typical of the Great Plains, with a mean annual temperature of 51°F and recorded extremes of 117 to -34°F. The mean temperature during January, the coldest month, is 22.2°F., and the mean temperature during July, the warmest month, is 77.3°F at Lincoln. The mean annual precipitation at Lincoln is 28.61 inches, with recorded annual extremes of 32.15 inches at Kramer and 15.60 inches at Ashland (References 4 and 5). Seventy-five percent of the annual precipitation occurs during April through September. Winter precipitation is primarily snowfall. Spring rains, particularly in June, are often intense, and have amounted to depths of 16.5 inches near David City in approximately 12 hours. Combinations of snowmelt, intense local storms, and normal rains generally provide conditions for the greatest volume and peak runoff (Reference 5). The average length of the growing season is 162 days, with 70 percent of the rainfall occurring during that time (Reference 4).

The soils of the area are moderately fine to fine-textured, well-drained soils that developed in the Peorian loess on the uplands. Predominant upland soils are Adair, Burchard, Crete, Geary, Morill, Pawnee, Shelby, and Wymore. The stream valleys are composed of well-drained to excessively well-drained alluvial soils (Reference 6). These soils consist of alluvial land and Hobbs, Colo, Rokeby, and Muir soils series. The native vegetation for the area is tall prairie grasses and is rated as a fair hydrologic condition. However, most of the agricultural areas are planted with crops of corn, soybeans, milo, wheat, alfalfa, and sorghum. Woodlands are located mainly along the watercourses. In some areas, woodland cover extends out into wider bottoms but often it is rather narrow (Reference 7).

Surface soils within the Salt Creek basin include glacial till: loess, clay, silt, and sand alluvium, and relatively small areas of exposed bedrock. The glacial till is moderately clayey and contains a few granite and quartzite boulders, some cobbles, and numerous pebbles. Peorian loess covers much of the uplands and is the principal parent material for the soils. The upper few feet of the loess have been transformed into productive soil by the natural additions of organic matter. Deposits within the valleys are geologically recent accumulations of dark, silty-to-clayey sediment washed from the uplands. This alluvium has been enriched by the natural addition of organic matter and is some of the most productive farmland in the region. Some of the valley farmland is less productive because of a higher concentration of salt in the soils. These areas of high soil salinity tend to be

small and isolated in nature. Bedrock in the study area is Pennsylvanian and Peruvian age limestone with interbedded shale and shaley limestone and interbedded shale and sandstone of the Dakota Group of the Cretaceous age. Numerous small outcrops of rusty brown Dakota sandstone exist southwest of Lincoln, north of Lincoln along Little Salt Creek, and north of Waverly along Rock Creek (Reference 6).

Salt Creek is a major right-bank tributary to the Platte River, with a drainage area at its mouth of 1,621 square miles. The drainage area of Salt Creek at the downstream County line is approximately 1,036 square miles. The tributaries of Salt Creek within Lancaster County, in an upstream direction, are:

<u>Stream</u>	<u>Drainage Area (miles<sup>2</sup>)</u>		<u>Confluence at River Mile</u>
	<u>Tributary</u>	<u>Salt Creek</u>	
Camp Creek	35.8	1,035	14.96
Rock Creek	137.0	999	15.81
Jordan Creek	13.2	838	20.88
Stevens Creek	51.1	806	24.70
Little Salt Creek	45.8	745	28.02
Deadman's Run	9.5	694	30.50
Oak Creek	258.0	681	32.01
Antelope Creek	12.5	424	32.25
Middle Creek	99.2	406	34.70
Haines Branch	68.0	303	36.06
Beal Slough	13.2	234	37.78
Cardwell Branch	16.4	215	42.93
Hickman Branch	68.0	167	57.71
Wittstruck Creek	9.3	92	64.38
Spring Branch	10.1	71.8	71.46
Olive Branch	61.7	61.7	71.46

The average stream bed slope of the basins for which a detailed study was made is:

<u>Stream</u>	<u>Average Stream Bed Slope (ft/mi)</u>
Salt Creek	3.21
Stevens Creek	7.71
Oak Creek	6.30
North Oak Creek	7.23
Middle Creek	11.24
South Branch Middle Creek	10.97
Haines Branch	9.96

The above physical basin parameters are taken from a USGS report (Reference 8).

The Little Nemaha River basin has a total drainage area of 892 square miles at its confluence with the Missouri River. The headwaters are in east-central Lancaster County and in the southwest corner of Otoe County. The Village of Bennet lies in the headwaters at river mile 69.09 above the mouth where the drainage area is 20 square miles. The



stream gradient is approximately 16 feet per mile (fpm) at State Highway 43. The topography is predominately gently to moderately sloping. Surface elevations range from approximately 1,460 feet on the divide to approximately 1,200 feet at the downstream end of the study (Reference 8).

The upper Big Nemaha watershed contains 180 square miles, of which 48.5 square miles drain the southern portion of Lancaster County. The Big Nemaha River originates in southern Lancaster County and flows southeasterly to its confluence with the Missouri River. The topography is predominantly gently to moderately sloping, with surface elevations ranging from 1,140 feet at the lower end of the watershed to 1,440 feet at the divide. The stream gradient is approximately 7 fpm, with some channelization occurring on major tributaries.

Hickman Branch joins with Olive Branch at Roca to form the main stream, Salt Creek. The Salt Creek basin is 38 miles long and 62 miles wide, with a total drainage area of 1,627 square miles. Downstream from Roca, Salt Creek flows northward to Lincoln, then northeastward to its confluence with the Platte River just east of Ashland. The major topographic features are moderately to steeply rolling uplands. Present stream cuts range from 5 to 30 feet (Reference 9).

Salt Creek originates in the southern part of Lancaster County where the Olive, North, and Spring Branches join to form the main stream near Sprague. Downstream of this point, Salt Creek flows generally northward to Lincoln, then northeastward to its confluence with the Platte River near Ashland. Ground elevations in the basin vary from approximately 1,500 feet National Geodetic Vertical Datum of 1929 (NGVD) in the upper basin to approximately 1,100 feet NGVD at the downstream study limit in Lincoln to approximately 1,050 feet NGVD at the mouth near Ashland. The total drainage area at the downstream study limit is approximately 825 square miles. The Salt Creek floodplain within the zoning jurisdiction of Lincoln is used for agricultural, commercial, industrial, residential, and recreational purposes.

Stevens Creek is a tributary to Salt Creek, which originates near Cheney. It drains 55 square miles of rolling hills and flows in a northerly direction. Elevations in the basin range from 1,400 feet NGVD in the upper basin to 1,120 feet NGVD at the mouth. The floodplain is mostly rural in nature.

Stevens Creek Overflow, which flows between Stevens Creek and Salt Creek, carries the excess flow of water that the Stevens Creek channel cannot handle because this area is flat.

Stevens Creek Tributary drains approximately 6 square miles between Lincoln and Stevens Creek. The basin elevations range from 1,350 to 1,180 feet NGVD. The floodplain is mostly rural.

Oak Creek, a tributary to Salt Creek, originates in Butler County approximately 2 miles north of Brainard, and flows in a southeasterly direction to its confluence with Salt Creek near the State fairgrounds in Lincoln. The total drainage area of Oak Creek is approximately 263 square miles. The elevations in the basin range from approximately 1,650 feet NGVD in the upper basin to approximately 1,120 feet NGVD at the mouth. The Oak Creek floodplain within the Lincoln zoning jurisdiction is used for agricultural, commercial, industrial, residential, and recreational purposes.

Middle Creek is a tributary to Salt Creek. It begins in eastern Seward County near Garland, and flows in an easterly direction to its confluence with Salt Creek at the BNRR yards in Illinois. Elevations in the basin range from approximately 1,550 feet NGVD in the upper basin to approximately 1,130 feet NGVD at the mouth. The total drainage area of Middle Creek is approximately 102 square miles. The Middle Creek floodplain within the Lincoln zoning jurisdiction is used primarily for agricultural purposes. It is also used for some residential and commercial purposes.

Antelope Creek is a tributary to Salt Creek. It originates near Cheney, and flows in a northwesterly direction to join Salt Creek near the State fairgrounds in Lincoln. Elevations in the basin range from approximately 1,350 feet NGVD in the upper basin to approximately 1,120 feet NGVD at the mouth. Antelope Creek has a total drainage area of approximately 13 square miles. Antelope Creek floodplain development ranges from highly urbanized to rural areas. The floodplain is used for agricultural, commercial, residential, and recreational purposes.

Beal Slough is a tributary to Salt Creek. It originates near Cheney and flows northwesterly to its confluence with Salt Creek near the State penitentiary in Lincoln. Beal Slough drains approximately 13 square miles. Elevations range from approximately 1,350 feet NGVD in the upper basin to approximately 1,135 feet NGVD at the mouth. The floodplain is used for agricultural, commercial, and residential purposes.

Haines Branch is a left-bank tributary to Salt Creek. Haines Branch begins approximately 2 miles north of Denton, where Haines Creek and Cheese Creek join to form its main channel. It then flows generally eastward to join Salt Creek just downstream of Van Dorn Street in Lincoln. Elevations range from approximately 1,500 feet NGVD in the upper basin to approximately 1,135 feet NGVD at the mouth. The total drainage area is approximately 68 square miles. The floodplain is used primarily for agricultural and recreational purposes.

Cardwell Branch is a tributary to Salt Creek. It originates approximately 3.5 miles northwest of Martell, and flows in a northeasterly direction to its confluence with Salt Creek just upstream of U.S. Highway 77 south of Lincoln. Cardwell Branch drains an area of approximately 16 square miles. Elevations range from approximately 1,300 feet NGVD in the upper basin to approximately 1,160 feet NGVD at the mouth. The Cardwell Branch floodplain is used primarily for agriculture.

Elk Creek is a tributary to Oak Creek. It begins in eastern Seward County approximately 2 miles east of Garland, and flows in a southeasterly direction to its confluence with Oak Creek just downstream of U.S. Highway 34. Elevations range from approximately 1,550 feet NGVD in the upper basin to approximately 1,150 feet NGVD at the mouth. Elk Creek drains an area of approximately 27 square miles. The floodplain is used primarily for agricultural purposes.

Lynn Creek is a tributary to Oak Creek. It originates approximately 2 miles north of Lincoln and flows in a southeasterly direction joining Oak Creek just upstream of its mouth. Elevations range from approximately 1,200 feet NGVD to approximately 1,125 feet NGVD. Lynn Creek drains an area of approximately 4 square miles. The floodplain of Lynn Creek within the study limits is used for recreational, commercial, and residential purposes.